

CLAIMS

What is claimed is:

1. A method for de-inking fibrous waste, comprising:  
5 disposing the fibrous waste in a pressure vessel;  
introducing defibrating solution into the pressure vessel;  
introducing de-inking solution into the pressure vessel;  
10 altering the internal pressure of the pressure vessel from ambient;  
returning the internal pressure of the pressure vessel to ambient; and  
15 removing, from the pressure vessel, ink released from the fibrous waste by action of the de-inking solution.
2. The method of claim 1, wherein the step of disposing comprises disposing fibrous waste selected from the group  
20 consisting of mixed office waste, old corrugated cardboard, carrier stock, and paperboard.
3. The method of claim 1, wherein the step of disposing comprises disposing the fibrous waste into the pressure  
25 vessel in baled form.
4. The method of claim 1, wherein the step of introducing defibrating solution comprises introducing a caustic solution.

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5. The method of claim 1, wherein the steps of introducing defibrating solution and de-inking solution occur simultaneously.

5 6. The method of claim 1, wherein the step of introducing defibrating solution occurs prior to the step of introducing de-inking solution.

10 7. The method of claim 1, wherein the step of introducing de-inking solution occurs prior to the step of introducing defibrating solution.

15 8. The method of claim 1, wherein the step of altering the internal pressure of the pressure vessel from ambient comprises increasing the internal pressure of the pressure vessel.

20 9. The method of claim 1, wherein the step of altering the internal pressure of the pressure vessel from ambient comprises decreasing the internal pressure of the pressure vessel.

25 10. The method of claim 1, wherein the step of altering the internal pressure of the pressure vessel from ambient comprises sequentially increasing and decreasing the internal pressure of the pressure vessel, each for selected time interval.

30 11. The method of claim 1, wherein the step of altering the internal pressure of the pressure vessel from ambient

comprises maintaining the altered internal pressure of the pressure vessel for a selected period of time.

12. The method of claim 1, further comprising:

- 5       removing defibrated and de-inked fibrous waste from the pressure vessel; and  
          subjecting the defibrated and de-inked fibrous waste to a mechanical pulping process.

10       13. The method of claim 12, wherein the step of subjecting comprises bleaching the defibrated and de-inked fibrous waste.

15       14. The method of claim 1, further comprising the step of introducing compressed gas into the pressure vessel to agitate the fibrous waste.

15. An apparatus for defibrating and de-inking fibrous waste, comprising:  
20       a pressure vessel;  
          a source of defibrating fluid;  
          a source of de-inking fluid;  
          a pressure-reducing element in fluid communication with the pressure vessel; and  
25       a pressure-increasing element in fluid communication with the pressure vessel.

16. The apparatus of claim 15, wherein the pressure vessel is adapted for receiving the fibrous waste in  
30       baled form.

17. The apparatus of claim 15, wherein the source of defibrating fluid is a reservoir of caustic liquid.

5 18. The apparatus of claim 15, wherein the source of de-inking fluid is a reservoir of de-inking liquid.

19. The apparatus of claim 15, wherein the source of defibrating fluid and the source of de-inking fluid are a  
10 common reservoir.

20. The apparatus of claim 19, wherein the reservoir is adapted for receiving water for diluting the defibrating and de-inking fluids.

15 21. The apparatus of claim 15, wherein the pressure-reducing element is a vacuum pump.

22. The apparatus of claim 15, wherein the pressure-increasing element is a device selected from the group consisting of a pump and a compressor.

23. The apparatus of claim 15, further comprising a programmable controller in communication with and for  
25 controlling the pressure-reducing and pressure-increasing elements.

24. The apparatus of claim 15, further comprising a pulping system for pulping defibrated and de-linked  
30 fibrous waste removable from the pressure vessel.

25. A method of improving the degree of defibrillation in a fibrous waste slurry, comprising:

introducing defibrating fluid into the slurry;  
5       subjecting the slurry and defibrating fluid to negative pressure;  
conveying the slurry and defibrating fluid, while under negative pressure, through a conduit, whereby the length of the conduit and the rate of conveyance of the  
10       slurry and defibrating fluid through the conduit result in a predetermined period of time during which the slurry and defibrating fluid are subject to the negative pressure.

26. The method of claim 25, further comprising  
15       introducing the slurry and defibrating fluid, subsequent to having been subject to the negative pressure in the conduit, into a pressure-equalization vessel for enabling the slurry and defibrating fluid to be brought to  
20       substantially ambient pressure.

27. The method of claim 25, wherein the step of  
25       subjecting the slurry and defibrating fluid to negative pressure comprises passing a first quantity of the slurry and defibrating fluid through a first vacuum chamber.

28. The method of claim 27, wherein the step of  
30       subjecting the slurry and defibrating fluid to negative pressure further comprises passing a second quantity of the slurry and defibrating fluid through a second vacuum

chamber operating in reciprocal fashion with the first vacuum chamber.

29. An apparatus for improving the degree of defibration  
5 in a fibrous waste slurry provided by a fibrous waste  
pulsing system, comprising:

a first conduit for conveying the fibrous waste  
slurry from the fibrous waste pulsing system;

- 10 a source of defibrating fluid in fluid communication  
with the first conduit;

a source of negative pressure in fluid communication  
with the first conduit for subjecting the fibrous waste  
slurry and defibrating fluid to negative pressure;

- 15 a second conduit in fluid communication with the  
source of negative pressure;

a pressure varying element for conveying the fibrous  
waste slurry and defibrating fluid, while under negative  
pressure, through the second conduit; and

- 20 a pressure equalization vessel in fluid  
communication with the second conduit for receiving the  
conveyed fibrous waste slurry and defibrating fluid, and  
for returning the fibrous waste slurry and defibrating  
fluid to substantially ambient pressure.

- 25 30. The apparatus of claim 29, further comprising a  
programmable controller for controlling the source of  
defibrating fluid, the source of negative pressure, and  
the pressure varying element.

31. The apparatus of claim 29, wherein the source of negative pressure further comprises a vacuum chamber through which the fibrous waste slurry and defibrating fluid flow.

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32. The apparatus of claim 29, wherein the source of negative pressure further comprises first and second vacuum chambers through which the fibrous waste slurry and defibrating fluid flows in an alternating, reciprocal fashion.

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33. The apparatus of claim 29, wherein the pressure varying element comprises a vacuum pump.

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34. The apparatus of claim 29, wherein the pressure varying element comprises an element selected from the group consisting of a compressor and a pump.

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35. The apparatus of claim 29, wherein the pressure equalization vessel is comprised of a blow tank.

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